

Notes on Tabanidae (Diptera) of the Oriental Region III. New and Little-Known Tabanidae from Borneo¹

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Abstract.—Fourteen species of Tabanidae were examined in three small collections from Sabah, Malaysia (North Borneo) and southeastern Borneo (Indonesia). Five new species, *Haematopota quadrifenestrata*, *Tabanus atratoides*, *Tabanus atropilosus*, *Tabanus samawangensis*, and *Tabanus transversus*, are described from Sabah, and one new species, *Tabanus atristylatus*, is described from southeastern Borneo. Two species, *Tabanus brevicallus* and *T. stantoni* are recorded from northern Borneo (Sabah) for the first time. *Chrysops translucens*, known from Sarawak and Brunei in northern Borneo, is here recorded from Sabah. Collection records are summarized, and observed variation in taxonomic characters is discussed.

The tabanid fauna of peninsular Malaysia and Borneo has remained unstudied since the review by Philip (1960a, 1960b). A recent small collection of 33 specimens from Sabah, Malaysia, in northern Borneo, by scientists from the National Museum of Natural History, Washington, D.C., yielded 11 species of Tabanidae, 5 of which proved to be undescribed, and an undescribed genus in the Pangoniini, the first representative of this tribe known from the Oriental Region. An additional 11 specimens from Sabah in the Museum of Comparative Zoology, Harvard University, and a specimen from southeastern Borneo in the Cornell University collection, yielded 3 additional undescribed species of *Tabanus*. Two species in the new genus of Pangoniini are treated in a separate paper. The notes and descriptions provided here supplement the review by Philip.

The relatively large number of undescribed species in these small collections suggests that the tabanid fauna of Borneo is more diverse than presently realized, and that a significant percentage of the fauna remains to be discovered. This is probably true for most of the Oriental Region, as suggested by Burton (1978). Unless a major effort is made to adequately sample the horse fly fauna of Malaysia and Indonesia, it is unlikely that we will attain a good understanding of many species groups in Tabanidae before destruction of tropical forests and other natural habitats extirpates the indigenous fauna.

Chrysops translucens Macquart, 1838

Material examined.—MALAYSIA: Sabah; Weston, 11 August 1983, G. F. Hevel & W. E. Steiner (1 ♀).

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This is the first record of this species from Sabah, but the site of collection on the northwestern coast is near Brunei and Sarawak, where *translucens* has been recorded (Philip, 1960b). The female seen here is 7.6 mm long, and agrees well with published descriptions. Philip states that *translucens* is a "larger" species (9 mm), but other characters, particularly the reddish yellow frontoclypeus, swollen dark brown tibiae, posteriorly divided crossband of the wing, and the yellow basal bands on abdominal terga 1 and 2 will separate this species from other *Chrysops* in the Oriental Region.

***Haematopota pendleburyi* Stone & Philip, 1974**

Material examined.—MALAYSIA: Sabah; 1 km. s. Kundasang, el. 1530 m., 26 Aug. 1983, G. F. Hevel & W. E. Steiner (3 ♀), 22 Aug. 1983 (1 ♀), 25 Aug. 1983, (1 ♀); Kinabalu National Park, Headquarters area, el. 1560 m., 7 Sept. 1983, (1 ♀), 9 Sept. 1983 (3 ♀), G. F. Hevel & W. E. Steiner.

The specimens examined here agree well with the original description by Stone & Philip (1974). Length of specimens 8–9.6 mm, width of the front at vertex 0.6–0.8 height, and the apical palpomere of the maxillary palpi gray to brown tomentose. One female from Kundasang has a narrower frontal callus than usual and lacks a dorsal extension. Stone & Philip did not mention the rather strikingly bicolored abdomen. Terga 1–3 are light brown, terga 4–7 are black, the transition usually occurring abruptly at the apex of tergum 3. The ventral surface is similar, except the anterior sterna are more yellowish. The posterior margins of all terga are narrowly gray, slightly wider at the lateral margins. The gray bands on the ventral surface are narrow medianly, abruptly widened laterally, especially on posterior segments. Specimens from Mount Kinabalu average slightly larger than those from Kundasang.

***Haematopota quadrifenestrata* Burger, NEW SPECIES**

(Fig. 1)

Holotype Female.—Length 9.6 mm; wing length 9.2 mm; antenna 2.2 mm. Front parallel-sided, taller than wide, width at vertex 0.7 height, dark gray tomentose, bearing large paired irregular velvety black spots laterally, broadly contiguous with eye margins, narrowly separated from upper margins of callus, submedian paired subshining black spots below vertex, and small pale grayish spot at apex of dorsal extension of callus; callus about 2.5 times broader than tall (excluding dorsal extension), narrowly contiguous with eye margins at ventrolateral corners, upper margin evenly convex, with broadly triangular median dorsal extension extending nearly two-thirds distance to vertex; interantennal spot large; face and parafacials gray, except for sharply delimited velvety black transverse stripe beneath antennae that extends along ventral margin of eyes; scape of antenna shining dark brown, cylindrical, four times longer than thick, densely clothed with semi-erect black setae, flagellum slender, black, 1.5 times longer than scape; maxillary palpi gray-black, apical palpomere relatively stout, bearing black setae and scattered pale hairs along ventral margin.

Mesonotum dark brown tomentose, except postpronotal lobes and area behind head gray, bearing paired slender sublateral gray stripes expanding to strong spots at transverse suture, and paired gray crescentic spots anterior to scutellum, mostly black pilose with some silvery hairs intermixed laterally and posteriorly; scutellum wholly brown tomentose and black setose; pleuron gray tomentose and white pilose except dark brown along lower margin of mesanepisternum and upper margin of

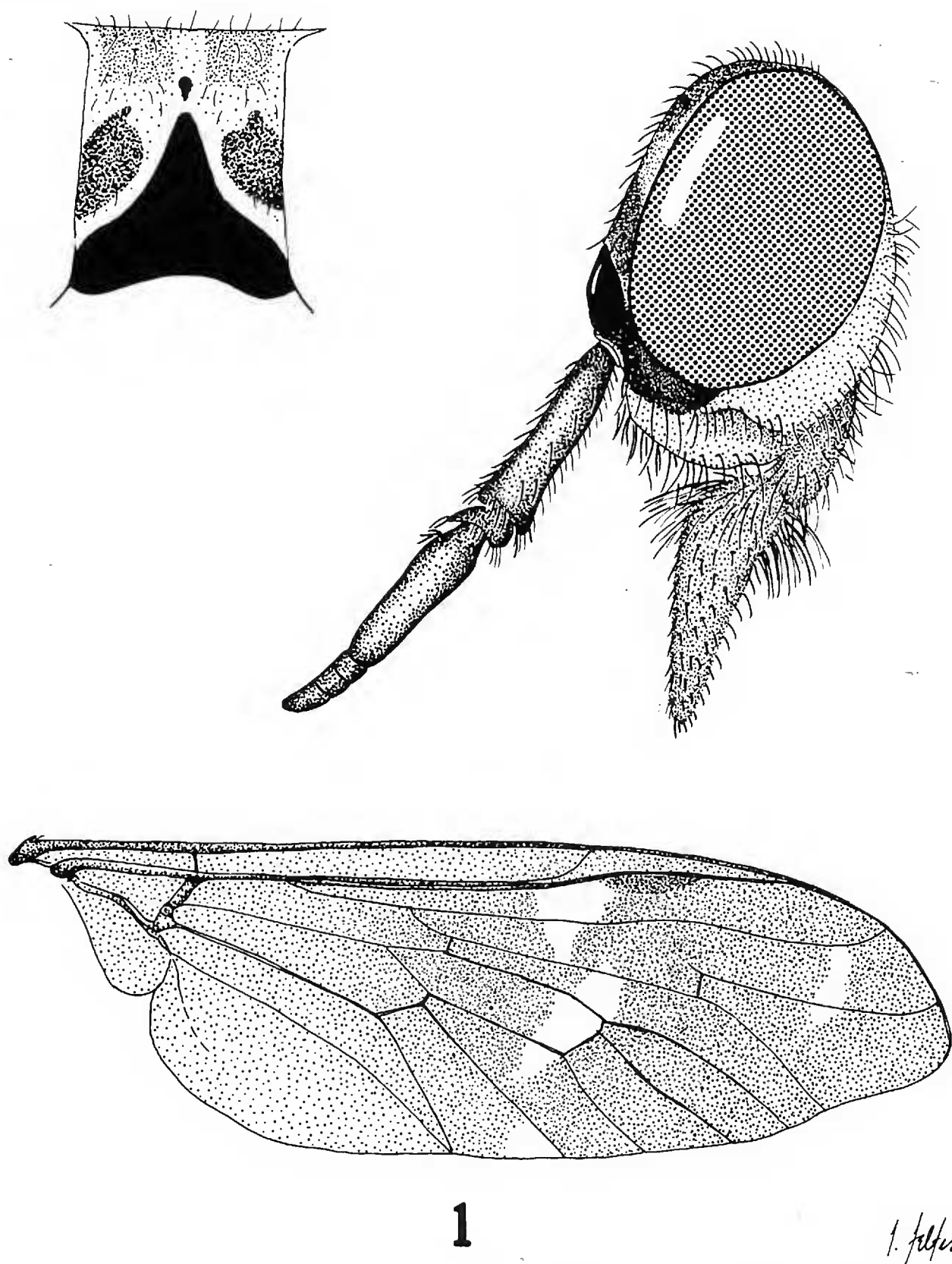


Figure 1. *Haematopota quadrifenestrata* Burger, female. Front, lateral view of head, wing.

katepisternum; coxae gray basally, blackish apically, femora black, fore and hind tibiae white on basal one-third, otherwise black, mid tibiae white on basal half, tarsi black, pale and dark areas of legs white and black pilose respectively; wings dark brown, except paler in radial and medial cells, normal pattern of rosettes reduced to four hyaline spots, three occurring anteriorly, medianly, and posteriorly in line just past middle of wing, and subapical streak in first submarginal cell, anterior spot in middle of marginal cell, narrowly extended into first submarginal cell, median spot elongate-oblique, extending from middle of first posterior cell through apical fourth of discal cell, narrowly extending into upper part of fourth posterior cell, posterior triangular spot in fifth posterior cell at hind margin of wing; halteres white, except base of stalk brownish.

Abdomen dark shining brown, all terga with narrow apical gray tomentose bands, that of tergum 1 broader than those on remaining terga, tergum 1 entirely gray tomentose laterally; sternum 1 entirely gray tomentose and white pilose, remaining sterna with conspicuous apical gray tomentose bands that are widened laterally, broadest on sterna 2–3, progressively narrower on posterior segments.

Holotype Female.—MALAYSIA: Sabah; Kinabalu National Park, Poring, el. 570 m., 18 Sept. 1983, G. F. Hevel & W. E. Steiner. Deposited in the National Museum of Natural History, Washington, D.C., U.S.A.

This species would key to *Haematopota bizonata* Schuurmans Stekhoven, from North Borneo [Sabah], in Stone & Philip (1974). It differs from *bizonata* in having the callus darker and more broadly convex above, more attenuated laterally and with a broadly triangular median dorsal extension, larger paired spots above the callus and conspicuous submedian black spots below the vertex, silvery hairs across the hind margin of the mesonotum, scutellum entirely dark brown tomentose and black pilose, wing pattern with four isolated hyaline spots, halteres white, mid- and hind tibiae white on basal half and one-third respectively, all abdominal terga bearing narrow apical gray tomentose bands, and sterna 2–7 dark brown basally, bearing apical gray tomentose bands.

H. quadrifenestrata appears to be a montane species, and may be restricted to the higher elevations of the Crocker Range in western Sabah. *H. bizonata* is recorded from the southeastern part of Sabah, near the coast. *H. pendleburyi* also occurs in montane habitats, but is immediately recognizable by the normal pattern of rosettes on the wing.

Tabanus atratoides Burger, NEW SPECIES

(Fig. 2)

Holotype Female.—Length 12.8 mm; wing length 10.8 mm. Front narrow, strongly diverging toward vertex, index 10.5, index of divergence 2.0, dark gray tomentose; basal callus black, inverted V-shaped, separated from eye margins along lower border; subcallus and frontoclypeus dark brown, black pilose; beard black; scape and pedicel black, gray tomentose, basal flagellomere brown, dorsal angle obtuse, 2.5 times longer than height, terminal annulations black, combined length one-half that of basal flagellomere; maxillary palpi black, wholly black pilose; eyes bare, without color pattern (revived).

Mesonotum, pleuron and scutellum black with bluish pruinose tones, entirely black pilose, except a tuft of white hairs on upper posterior margin of mesanepisternum; legs black; anterior third of wing brown tinted, extending into basal half of first posterior cell, rest of wing subhyaline, R_4 without spur; halteres dark brown.

Abdomen entirely black, black pilose, concolorous with thorax.

Holotype Female.—B. N. Borneo [Sabah, Malaysia], Mt. Kinabalu, Kenokok, 3300 ft., 22 April 1929, H. M. Pendlebury coll., F. M. S. Museum. Deposited in the Museum of Comparative Zoology, Cambridge, Massachusetts, U.S.A.

T. atratoides is close to *Tabanus stekhoveni* Philip (= *T. elegans* Schuurmans Stekhoven), originally described from western Sarawak by Schuurmans Stekhoven (1926). It differs, however, in having a less abruptly tapered dorsal extension of the basal callus, stouter palpi, infuscated anterior part of the wing strongly contrasting with the posterior hyaline area, and the femora not paler apically.

***Tabanus atristylatus* Burger, NEW SPECIES**
(Fig. 3)

Holotype Female.—Length 16 mm; wing length 12.8 mm. Front relatively narrow, slightly diverging toward vertex, index 8.5, index of divergence 1.5, yellowish gray tomentose, black pilose, with small irregular denuded brown spot at vertex, basal callus brown, narrowly triangular, well-separated from eye margins, with a broad dorsal extension; subcallus and adjacent frontoclypeus yellowish tomentose, otherwise frontoclypeus light gray tomentose, beard white; antennal scape, pedicel and basal flagellomere brown, terminal flagellomeres black, basal flagellomere length twice height, dorsal tooth strong; maxillary palpi light brown tomentose, apical palpomere rather slender basally, blunt apically, pale pilose at extreme base, remainder black pilose.

Mesonotum and scutellum brownish gray tomentose, black pilose, with scattered pale hairs intermixed, notopleural lobes reddish tinged, anterior half of mesonotum with indistinct brown median and sublateral stripes (best seen from behind); pleuron light gray tomentose, white pilose except scattered black hairs dorsally on posterior half of mesanepisternum; coxae light gray tomentose, white pilose, fore femora black, gray tomentose on outer surface, mid- and hind femora brown, gray tomentose, tibiae brown, except apical half of fore tibiae and extreme apices of mid- and hind tibiae darkened, fore tarsi black, mid- and hind tarsi brown basally, apical tarsomeres black; costal cell of wing yellow-brown tinted, rest of wing pale brown tinted along wing veins, subhyaline in interior of cells and along apico-posterior margin; halteres with base of knob dark brown, apex yellowish.

Abdomen brown dorsally, with terminal 3 segments slightly darkened, yellow-brown ventrally, all terga black pilose except white pilose on lateral margins, pale yellowish spot of hairs medianly on tergum 1, and small median yellow pilose triangles on terga 2–5 not underlain by pale integument; sterna 2–5 with large median dark-haired patches, sterna 6–7 entirely black.

Holotype Female.—S. E. BORNEO: 17–46 km. W. Batulitjin, 28 June–2 July 72, lowland rainforest, W. L. Brown. Deposited in the Cornell University Collection, Ithaca, New York, U.S.A.

T. atristylatus is in the *Tabanus malayensis* group, and is closest to *T. angustitriangularis* Schuurmans Stekhoven, known from Malaya, Sumatra and Java. It differs from *angustitriangularis* in being slightly larger, the wholly brown basal flagellomere, black fore femora, paler abdominal terga, smaller median triangles on terga 2–5, lateral borders of all terga broadly pale pilose, and sternum 6, as well as 7, wholly black. Precise definition of species limits for taxa related to *T. malayensis* Ricardo, and those of the *Tabanus immanis/fumifer* groups, is difficult. These groups need a thorough review to determine limits of variation within and between described species from Malaysia and Indonesia.

***Tabanus atropilosus* Burger, NEW SPECIES**
(Figs. 4, 5)

Female.—Length 11.2–12.4 mm; wing length 9.6–10.8 mm. Front narrow, diverging toward vertex, index 7.0, index of divergence 1.7–1.8, dark grayish brown tomentose and black pilose, basal callus brown, rectangular, about twice as tall as wide, contiguous with eye margins, median callus black, narrowly lanceolate to oval, widely separated from basal callus; subcallus denuded, shining brown; frontoclypeus

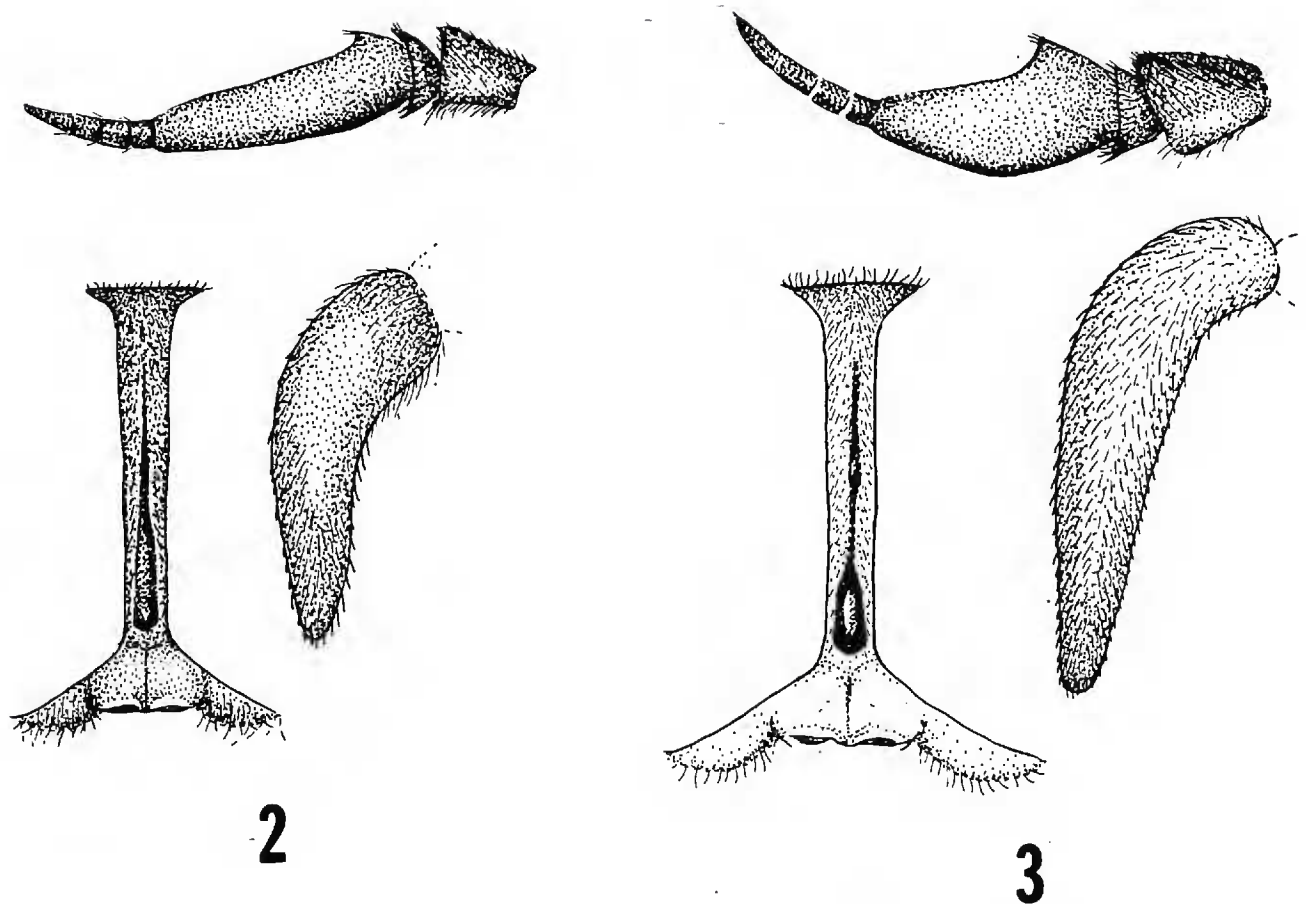


Figure 2. *Tabanus atratoides* Burger, female. Antenna, front, apical palpomere. Figure 3. *Tabanus atristylatus* Burger, female. Antenna, front, apical palpomere.

gray tomentose, white pilose, parafacials brownish tinged and black pilose laterad of subcallus along ventral margin of eyes, beard white; antennae brown, scape enlarged dorsally, shining, basal flagellomere elongate, with obtuse dorsal tooth, length twice height, and twice length of terminal flagellomeres; maxillary palpi light gray tomentose with some bluish gray tones, apical palpomere stout basally; eyes bare, pattern (revived) a narrow median transverse purple stripe on bright green ground.

Mesonotum brown tomentose with some grayish tones anteriorly and laterally, black pilose, scutellum concolorous, postpronotal lobes gray tomentose, notopleural lobes reddish gray; pleuron gray tomentose, white pilose, with some black hairs intermixed on mesanepisternum. Coxae gray tomentose, fore femora black, gray tomentose on outer surface and mixed black and white pilose, mid- and hind femora brown, gray tomentose, tibiae yellowish white basally, white pilose, apical one-third of fore tibiae and apical one-fourth of mid- and hind tibiae contrastingly black, tarsi black; anterior part of wing brownish tinged, sometimes concentrated in the marginal and first submarginal cell along veins R_{2+3} and R_4 , remainder of wing subhyaline, R_4 without spur, basal half of Cu vein forming lower margin of median cell with row of setulae; halteres yellowish to dark brown.

Abdomen reddish brown anteriorly, progressively darkened on posterior segments, black pilose, ventral surface light brown with a poorly-defined dark grayish tomentose, black-haired median stripe, paler areas yellowish pilose.

Male.—Length 10.4–11.6 mm; wing length 9.6–10 mm. Apical palpomere elongate-oval, gray tomentose, bearing mixed black and pale hairs; large and small

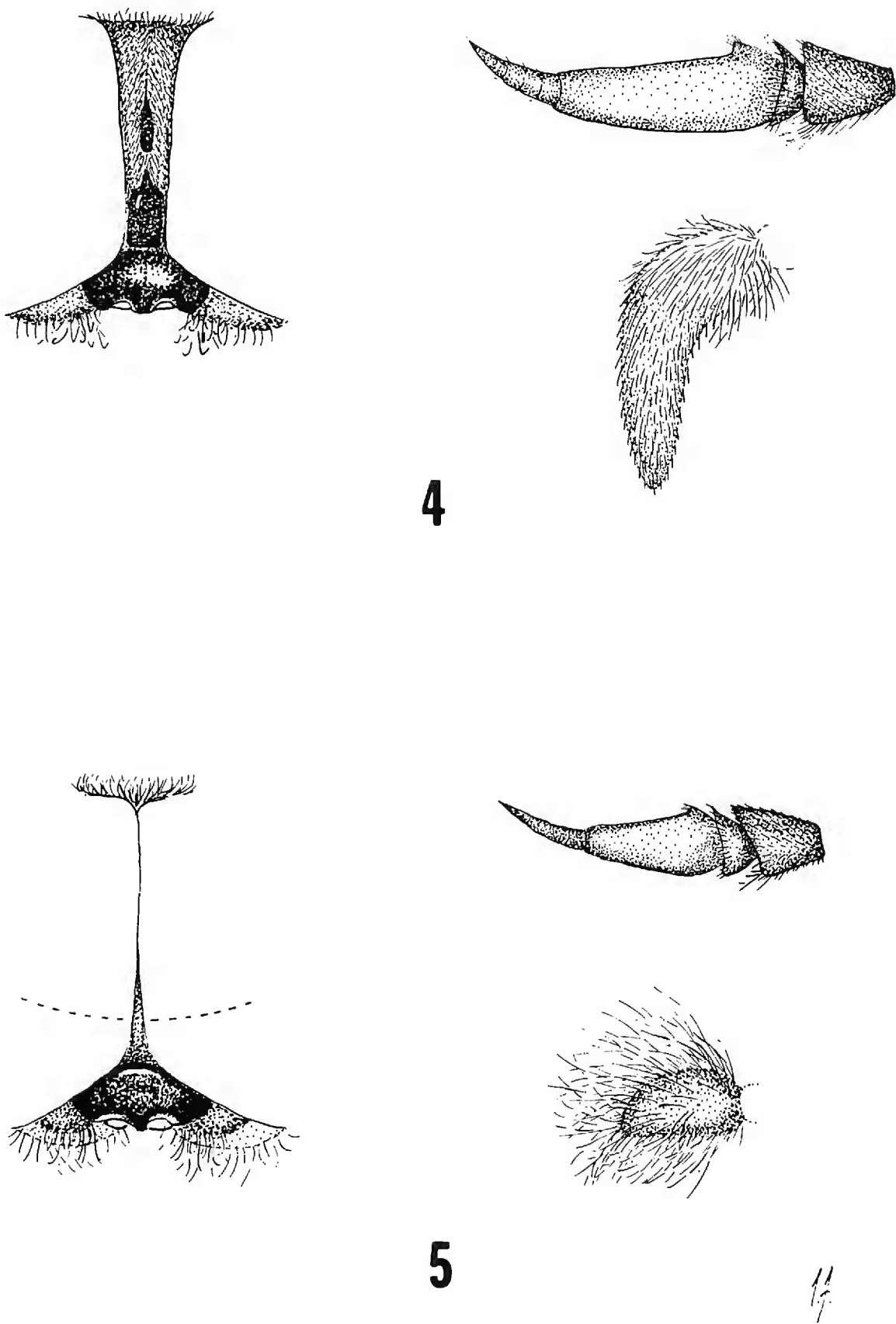


Figure 4. *Tabanus atropilosus* Burger, female. Front, antenna, apical palpomere. Figure 5. *Tabanus atropilosus* Burger, male. Front of head, antenna, apical palpomere.

eye facets sharply differentiated along lower one-third of eye, area of small facets continuing around posterior margin of eye nearly to vertex; postocular fringe of black hairs very long and curved forward over eyes, otherwise similar to female.

Holotype Female.—MALAYSIA: Sabah; Kinabalu National Park, Headquarters area, el. 1560 m, 9 Sept. 1983, G. F. Hevel & W. E. Steiner. Deposited in the National Museum of Natural History, Washington, D.C., U.S.A.

Paratypes.—2 ♀, 4 ♂; 1 ♀, same data as holotype; 7 Sept. 1983 (1 ♀), 5 Aug. 1983 (2 ♂); Poring, 8 Sept. 1983 (1 ♂); Mt. Kinabalu, Marei Parei, 5000 ft, April 27, 1929, F. M. Pendlebury Coll., F. M. S. Museums (1 ♂).

One female has a trace of a spur on the R₄ vein of the right wing only. The male from Marei Parei is darker than the others, with pale tibial markings very indistinct, and the ventral surface of the abdomen entirely black pilose. In all other respects, however, it is similar to the other males and thus is considered conspecific.

T. atropilosus is in the *ceylonicus* group, based on the narrow front, greatly elongate basal flagellomere, bare subcallus, strongly bicolored legs, and absence of contrasting markings on the mesonotum and abdomen. It also has a row of setulae on the basal portion of the Cu vein (most species in the *ceylonicus* group have at least 2–4 scattered setulae on the cu vein). I agree with Burton (1978) that although the *ceylonicus* group has some features in common with the *biannularis* group of *Tabanus*, they are distinct entities, based on present knowledge.

***Tabanus brevicallus* Philip, 1959**

Material examined.—MALAYSIA: Sabah; Tanjung Aru Beach, 29 August 1983, G. F. Hevel & W. E. Steiner (1 ♀); N. Borneo, Labuan Is., June 30, 1927, C. B. K. & H. M. P. [H. M. Pendlebury] (1 ♀).

This species has been recorded from the islands of Palawan and Mindanao, adjacent to Sabah, as well as other islands of the Philippine Archipelago. The records listed here are the first from Malaysia.

The female from Tanjung Aru Beach is in excellent condition. It agrees well with the original description of *T. brevicallus* (Philip, 1959), except for the narrower front (index 5.0), smaller size (length: 10 mm), the apical palpomere with more white hair mixed with black, and the entirely hyaline wing. The female from Labuan Island is somewhat rubbed and discolored but agrees closely with the Tanjung Aru Beach specimen.

***Tabanus brunnicolor* Group**

Four species of *Tabanus* related to *T. brunnicolor* Philip (= *T. brunneus* Macquart) were separated by Philip (1960b) from other Malaysian species of the *Tabanus fumifer-malayensis* groups in his key by the blackish brown legs and abdomens, dark “antealar tubercles” (= notopleural lobes), broader fronts (index: 7.0–8.5), eyes green on lower half, and size (length at least 16 mm). Included in this group of species are *Tabanus audyi* Philip, *T. brunnicolor*, *T. parabruneus* Schuurmans Stekhoven, and *T. parallelifrons* Schuurmans Stekhoven. Philip used the color of the basal callus, color of tibial pilosity, size of median abdominal spots, extent of excision and tooth height on the dorsal margin of the basal flagellomere, the frontal index, color of the mesonotum, and color of the ventral abdominal vestiture to separate these taxa. Unfortunately, these characters have not proven satisfactory for accurate identification. Especially variable are the frontal indices (the index of the holotype of *audyi* is 9.7), color of the tibiae (black in Malayan specimens, variably reddish basally in most Bornean specimens), mesonotal color, and color of the ventral abdominal vestiture. The eye colors cannot always be revived, especially when specimens have been in spirit. Clearly, these taxa need additional study to define the limits of variation in Malaya and in the northern part of Borneo. The

following identifications of specimens from Sabah are based on comparison with determined specimens, and from original descriptions in the literature.

***Tabanus brunnicolor* Philip, 1960**

Material examined.—MALAYSIA: Sabah; 1 km. S. Kundasang, el. 1530 m, G. F. Hevel & W. E. Steiner, 21 Aug. 1983 (1 ♀), 11 Sept. 1983 (1 ♀).

T. brunnicolor can be recognized by the uniformly dark chocolate-brown mesonotum and concolorous scutellum, black-brown abdominal terga bearing conspicuous lemon-yellow median triangles not connected to incisural bands, and wings subhyaline to lightly brown tinted. The basal flagellomere of the antenna is wholly black, moderately excised, and bears a moderate-sized blunt tooth. Tergum 1 of the abdomen has a conspicuous spot of yellow hairs in the middle; terga 2–5 bear small equilateral lemon-yellow median triangles apically that extend about one-third the length of each tergum; tergum 6 has a small median spot of yellow hairs on the apical margin; the lateral margins of terga 1–6 are broadly yellow-brown and golden pilose. The ventral surface of the abdomen is bright yellowish brown with golden hairs and black half-moon-shaped median black patches of hair basally on sterna 2–6, that on sternum 3 largest, becoming progressively smaller on succeeding sterna. Sternum 7 is entirely black.

A specimen of *T. brunnicolor* from Perak, Malaya, has the tibiae entirely black and black haired. Both females from Sabah have the mid- and hind tibiae reddish and pale pilose ventrally on the basal two-thirds, entirely black elsewhere. The fore tibiae of one female is entirely black, with scattered pale hairs; the other female has the fore tibiae reddish on the basal one-fourth, and pale hairs on the basal half of the outer margin. The frontal index of both females is 8.0, as is the determined specimen from Perak.

***Tabanus parabrunneus* Schuurmans Stekhoven, 1932**

Material examined.—B. N. Borneo [Sabah, Malaysia], Mt. Kinabalu, Lumu Lumu, 5,000 ft., 6.4.1929, H. M. Pendlebury coll. (3 ♀), 7.4.1929 (1 ♀); Kiau, 3,000 ft., 17.4.1929 (1 ♀).

I am not convinced that *T. parabrunneus* is specifically distinct from *T. brunnicolor* or *T. parallelifrons* Schuurmans Stekhoven. Characters previously used by Philip (1960b) and Schuurmans Stekhoven (1932) are too variable to be reliable. Pending additional study of more material, however, I tentatively recognize *parabrunneus* as distinct. The deeply excised basal flagellomere with a tall, acute dorsal tooth, lighter brown anterior abdominal terga contrasting with darker posterior segments, the pale median triangle on tergum 2 with a dark spot above the apex, and the paler segmentations of the abdominal terga are characteristic of *parabrunneus*, as presently defined.

The Mount Kinabalu specimens are 16.4–19.2 mm long, frontal indices 7.0–9.0, basal callus tall rectangular, not drop-shaped, basal flagellomere with a deep dorsal excision, mesonotum grayish brown, fore tibiae reddish on basal two-thirds of the outer margin, mid- and hind tibiae with basal two-thirds to nearly entire length reddish, darker at the apex. One female has the fore tibiae entirely black, and the mid- and hind tibiae reddish on the basal third of the ventral surface. The abdominal color and pattern is similar to *T. brunnicolor*, except for the basal 3 terga paler chestnut brown, contrasting with the blackish posterior segments, the paler

segmentations on terga 2–6, the narrower yellowish brown markings on the lateral margins of terga 1–5, and the paler yellow vestiture ventrally. One female has the pale segmentations of the abdominal dorsum overlain by yellow hairs; the others have only black hairs overlying the paler segmentations. The wings are more heavily tinted than in *T. brunnicolor*, but this feature may be variable.

***Tabanus parallelifrons* Schuurmans Stekhoven, 1926**

Material examined.—MALAYSIA: Sabah; Kinabalu National Park, Headquarters area, el. 1560 m, G. F. Hevel & W. E. Steiner, 5 Aug. 1983 (1 ♀), 8 Sept. 1983 (1 ♀); B. N. Borneo [Sabah, Malaysia], nr. Kinabalu, Tenompok Pass, 4,700 ft., Mar. 18, 1929, H. M. Pendlebury coll. (1 ♀).

This species is very close to *T. parabruneus*. Characters used by Philip (1960b) and Schuurmans Stekhoven (1926) to distinguish this species from relatives are too variable to be reliable, but pending a thorough review of this species and related taxa, I recognize it as a distinct species. The females examined here agree with descriptions of *parallelifrons* in having the excision of the basal flagellomere rather shallow, its dorsal tooth obtuse, and its extreme base reddish brown, the front paler grayish to gray-brown below, contrastingly darker above, and the mesonotum brown to reddish brown. For the specimens at hand, the frontal indices are 7.0–7.5, somewhat broader than cited by Philip and Stekhoven, the anterior abdominal terga are darker than in *parabruneus*, with no trace of paler segmentations, the pale median triangles on terga 2–5 are smaller, the median dark markings on the ventral surface of the abdomen are larger than in *T. parabruneus* and *T. brunnicolor*, extending the width of each segment, thus the individual sterna are blackish basally and pale yellowish brown apically. Leg markings are indistinguishable from *T. parabruneus*. One female has white hairs overlying the median abdominal triangles instead of the usual yellowish ones. *T. audyi* also has relatively small abdominal triangles, but also has the legs entirely black, with no reddish traces, a much narrower front, with a drop-shaped basal callus, the basal flagellomere entirely black, with a very shallow dorsal excision and low dorsal tooth, and the basal segments of the abdomen dark chocolate brown, not paler than posterior segments.

***Tabanus partitus* Walker, 1857**

Material examined.—MALAYSIA: Sabah; Tanjung Aru Beach, 3–4 August 1983, G. F. Hevel & W. E. Steiner (1 ♂), 20 August 1983 (1 ♀); 1 km. S. Kundasang, el. 1530 m, Aug. 1983 (1 ♀).

These specimens agree well with the description of *T. partitus* by Burger & Thompson (1981). The female from near Kundasang has the outer margin of the median abdominal stripe more irregularly serrated than the specimen from Tanjung Aru Beach.

***Tabanus samawangensis* Burger, NEW SPECIES**
(Fig. 6)

Holotype Female.—Length 12 mm; wing length 9.6 mm. Front narrow, diverging toward vertex, index 8.0, index of divergence 1.6, reddish gray tomentose, basal callus brown, parallel-sided below, tapering to slender dorsal extension; subcallus and adjacent upper frontoclypeus yellowish gray tomentose, remainder whitish tomentose, beard white; antennae orange-brown, terminal flagellomeres dark

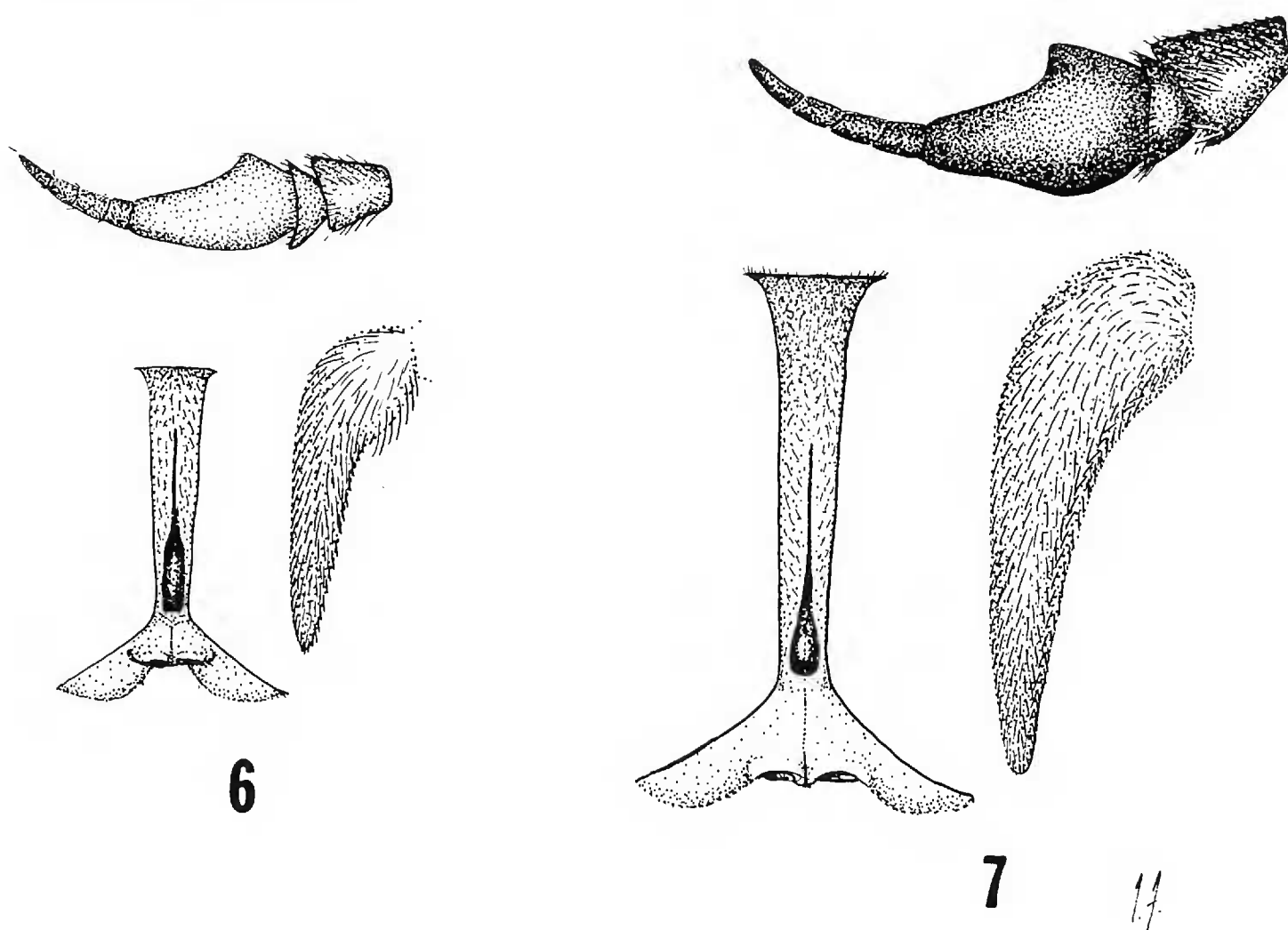


Figure 6. *Tabanus samawangensis* Burger, female. Antenna, front, apical palpomere. Figure 7. *Tabanus stantoni* Ricardo, female. Antenna, front, apical palpomere.

brown, basal flagellomere with moderate dorsal angle, about 1.5 times longer than broad; maxillary palpi pale yellowish gray, apical palpomere pale haired at base and on ventral surface, mostly black haired elsewhere; eyes bare, dark green (revived).

Mesonotum and scutellum light brown, gray tomentose, bearing mixed black and brassy yellow hairs, notopleural lobes reddish; pleuron gray tomentose, pale pilose, except posterior half of mesanepisternum with reddish tones; legs orange-brown except apical third of fore tibiae and the fore tarsi black, tibiae yellow haired ventrally, black haired dorsally, hind tibial fringe black; wings hyaline, R_4 without spur; halteres with knob yellow, stalk light brown.

Abdomen brown basally, gradually darkened apically, bearing mixed black and yellow hairs forming no discernible pattern, pale yellowish brown ventrally, gray pollinose and pale yellow pilose.

Holotype Female.—N. Borneo, Samawang, near Sandakan [Sabah, Malaysia], in jungle, 7th July 1927, C. B. K. & H. M. P. [H. M. Pendlebury], F. M. S. Museums. Deposited in the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A. The type locality is situated at approximately $5^{\circ} 50'N$, $118^{\circ} E$, on the northeastern coast of Sabah.

***Tabanus stantoni* Ricardo, 1911**

(Fig. 7)

Material examined.—Br. N. Borneo [Sabah, Malaysia], Papar, VI-7-51, Collr. G. W. Angalet (1 ♀).

A female in the Cornell University Collection agrees well with specimens from the British Museum collection, from Batu Tiga, except in having more extensive yellow hair on the hind femora and tibiae, and some golden hairs laterally on abdominal terga 1-3. Stone (1975) incorrectly synonymized this species with *T. immanis* Wiedemann. Since there has been some confusion about the identity of this species, and it has not been adequately figured, an illustration is provided.

***Tabanus transversus* Burger, NEW SPECIES**

(Figs. 8, 9)

Holotype Female.—Length 9.6 mm; wing length 9.0 mm. Front relatively narrow, diverging toward vertex, index 6.0, index of divergence 1.6, yellowish gray pollinose near subcallus, blackish beyond level of median callus, basal callus rectangular, reddish brown below, black above, separated from denuded subcallus and from eye margins, median callosity black, nearly as broad as basal callus and narrowly joined to it; subcallus denuded, dark brown; frontoclypeus yellowish gray tomentose except dark brown from lateral margins of subcallus along lower margin of eyes, beard white. Antennae reddish brown, terminal flagellomeres slightly darker, basal flagellomere elongate, slender, dorsal angle low, length 1.6 times longer than terminal flagellomeres; maxillary palpi dark bluish gray tomentose, basal palpomere densely long yellow pilose, apical palpomere stout basally, densely black setose, except for some pale hairs at extreme base; eyes bare, pattern (revived) a broad green diagonal median stripe on a dark purple ground.

Mesonotum and scutellum yellowish gray tomentose, yellow pilose, a broad subshining black transverse band present between the wings extending from notopleural lobes to but not including prescutellum; pleuron gray tomentose and pale yellow pilose; coxae gray tomentose, white pilose, femora black, gray tomentose, mostly pale pilose, distal outer margin of fore femora black pilose, tibiae pale yellowish white basally, white pilose, distal one-fifth sharply black, tarsi black; wings lightly brown tinted in costal cell and along anterior margin of wing, otherwise hyaline, R_4 vein without spur; halteres light brown.

Dorsum of abdomen black, black pilose, terga 1-2 yellowish gray tomentose and yellow pilose laterally, terga 3-4 similarly colored only on posterolateral margins, terga 3-4 with conspicuous median half-moon-shaped spots on posterior margin of each segment, extending about half length of segments, tergum 6 with pale apical fringe of hairs; ventral surface yellowish gray tomentose, pale yellowish pilose except sterna 2-3 narrowly brown basally and sternum 7 wholly black.

Holotype Female.—MALAYSIA: Sabah; 1 km. S. Kundasang, el. 1530 m, 24 Aug. 1983, G. F. Hevel & W. E. Steiner. Deposited in the National Museum of Natural History, Washington, D.C., U.S.A.

T. transversus is in the *Tabanus biannularis* group. It keys to *Tabanus macdonaldi* Philip, from Selangor, Malaya (Philip, 1960b). It differs from *macdonaldi* in having a broader front, no flat, bare tubercle at the vertex, broader median callus, more grayish frontoclypeus that is sharply brownish laterad to the subcallus, pleuron gray

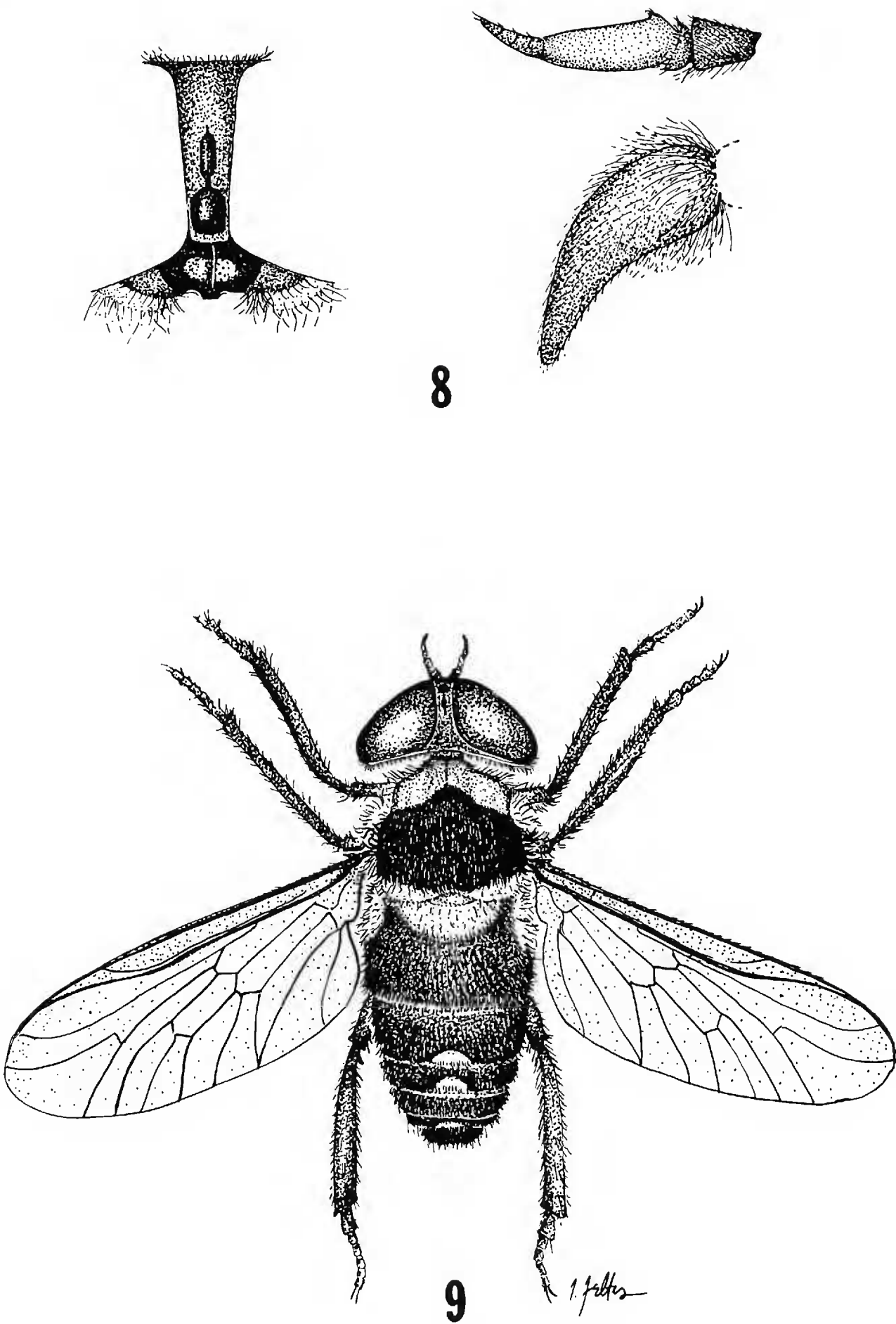


Figure 8. *Tabanus transversus* Burger, female. Front, antenna, apical palpomere. Figure 9. *Tabanus transversus* Burger, adult female, dorsal view.

tomentose, not yellow, yellow half-moon-shaped spots on terga 3–4 and a narrow apical yellow band of hair on tergum 6. *T. transversus* is quite distinct from *Tabanus auricircus* Philip, described from southeastern Sabah (Philip, 1979).

As indicated by Burton (1978), who described 6 new species of the *biannularis* group from Thailand and Laos, this is an extraordinarily diverse group of species that, despite considerable study, remains incompletely known. It is likely that many species remain to be described, since most species seem to occupy limited ranges. A thorough study of the interspecific variation in this group is needed.

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